Test Procedure for

SAMPLING BITUMINOUS MATERIALS, PRE-MOLDED JOINT FILLERS, AND JOINT SEALERS

TxDOT Designation: Tex-500-C

Effective Date: May 2020 – November 2023

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1. SCOPE

1.1 These procedures apply to the sampling of liquid, semi-solid, or solid bituminous materials at the point of manufacture, storage, and delivery. Sampling can be from tanks, containers, bulk storage, tank cars, distributors, drums, or cakes, for the following purposes:

- preliminary investigation of material source,
- quality tests of bituminous materials at point of manufacture, and
- inspection of materials at the site of the project.

1.2 The test method is in several parts, containing procedures for the following:

- Part I—Sampling from Storage Tanks;
- Part II—Sampling from Pipelines;
- Part III—Sampling from Tank Cars, Trucks, or Distributors;
- Part IV—Sampling from In-line Blended Materials;
- Part V—Sampling from Drums, Packages, or Cakes;
- Part VI—Sampling Pre-Molded Expansion Joint Filler and Asphalt Plank;
- Part VII—Sampling Joint Sealers;
- Part VIII—Sampling Bituminous Marker Adhesive;
- Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples.

1.3 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

1.4 This test procedure does not claim to cover all the required measures to address health and safety concerns. It is the responsibility of the sampler to take all the necessary precautions and follow any applicable health and safety procedures.

2. GENERAL PROCEDURES

2.1 Except as described in specific sections below, one can perform sampling in accordance with AASHTO R66 - "Standard Practice for Sampling Asphalt Materials."

2.2 Use appropriate safety precautions when sampling or handling liquid or semisolid materials.

2.2.1 Use, as a minimum, the following Personal Protective Equipment (PPE):

- gloves;
- glasses, goggles, or face shield;
- long sleeve shirt;
- long pants; and
- shoes that cover the entire foot.

2.2.2 For sampling liquid asphalts, open sample valves with caution; as asphalt materials in all types of containers may be under pressure.

2.3 Use appropriate containers with a capacity corresponding to the required amount of material for sampling:

- liquid asphalt, other than emulsions and cutbacks: double-seal friction-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- emulsified asphalt: wide-mouth plastic jars, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- cutback asphalt: double-seal friction-top or screw-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- solid or semisolid bituminous materials from drums, packages, or cakes: friction-lid bucket or can, clean and dust-free, dry, with a minimum capacity of 1 gal. (4 L);
- pre-molded expansion joint filler and asphalt plank: box or light piece of plywood, clean and dust-free, dry, with a minimum base dimension of 12 x 12 in. (300 x 300 mm);
- joint sealers: friction-lid bucket or can, clean and dust-free, dry, with a minimum capacity of 1 gal. (4 L); or
- bituminous marker adhesive: sample boxes, clean and dust-free, dry, with a minimum capacity of 12 to 15 lb. (5.5 to 7 kg.).

2.4 Collect representative samples.

2.4.1 When sampling liquid asphalts other than emulsions, fill the container to approximately 95% capacity; leaving a small amount of space for stirring the sample before the tests. When sampling emulsions, completely fill the container to avoid any air entrapment in the sample.

2.4.2 Eliminate any possible source of contamination including but not limited to:

- remaining residual of other types and grades of asphalt in the tank or line being sampled;
- presence of cleaning agents in the tank, line, or nuzzle bar being sampled;
- remaining residual of other types and grades of asphalt, cleaning agents, or any foreign matter on the sampling device; or
- dust, moisture, fuel, or any foreign matter in the sampling container.

2.4.3 Avoid any alteration of the material being sampled by filtering or screening.

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PART I—SAMPLING FROM STORAGE TANKS

3. SCOPE

3.1 Refineries and asphalt producers are required to store semi-solid asphalt, liquid asphalt, and emulsified asphalt in metal tanks provided with a number of drain cocks, depending on the capacity of the tank, located on the side at definite distances from the top.

3.2 Use the following procedure when sampling liquid bituminous materials from these storage tanks.

4. PROCEDURE

4.1 The number of samples collected per bulk storage tank mainly depends upon the capacity of the tank.

4.1.1 Take two samples, from 1/3 and 2/3 of tank depth, for tanks of up to 400,000 gal. (1,500,000 L) capacity.

4.1.2 Take three samples, from top, middle, and bottom of the tank, for tanks of more than 400,000 gal. (1,500,000 L) capacity.

4.1.3 If the tank contains a mechanism such as Mechanical Agitators or Circulators, to ensure uniformity of the material contained within it and observation or testing samples from various levels within the tank verifies the mechanism, a single sample is satisfactory for test purposes.

4.1.4 When collecting samples for submission to the Department, samples from multiple elevations on the tank are not required except by the Engineer's request. In this case, Department representatives may randomly choose at least one valve location for sampling.

4.2 Wearing the required safety equipment, collect the sample using either Valve or Thief or Dip Sampler method.

4.2.1 **Valve Method:** Open the appropriate valve or drain cock on the tank and allow enough material (a minimum of 1 gal or 4 L) to flow into a waste container to ensure a representative sample. Then, fill the sample container from the valve or drain cock. Figure 1 shows common types of valves used for sampling liquid asphalt from tanks.

4.2.2 **Thief or Dip Sampler Method:** Due to safety concerns, it is not recommended to take samples by Thief or Dip method from the top of the tank, unless no other method of sampling is available. If valves or drain cocks are not available, take samples by lowering a Thief Sampler or a weighted container (Dip method) into the tank.

4.2.2.1 **Thief Method:** This type of sampler contains a cylindrical tube with no top closure and a closing valve at the bottom. The sampler should be lowered to the tank with the bottom valve open. When the sampler reached to the desired depth, the bottom valve should be closed. Then the sample is gently pulled out and transferred to a container. Figure 2 shows an acceptable type of Thief sampler.

4.2.2.2 **Dip Method:** The container should be fitted with a stopper, removable by a string or wire when the container is at the proper depth in the tank. The sample is gently pulled out and transferred to a new container. Figure 3 shows a common type of Dip sampler.

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4.3 When sampling liquid asphalts other than emulsions, fill the container to approximately 95% capacity; leaving a small amount of space for stirring the sample before the tests. When sampling emulsions, completely fill the container to avoid any air entrapment in the sample.

4.3.1 Use appropriate containers with a capacity corresponding to the required amount of material for sampling:

- liquid asphalt, other than emulsions and cutbacks: double-seal friction-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- emulsified asphalt: wide-mouth plastic jars, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- cutback asphalt: double-seal friction-top or screw-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- solid or semisolid bituminous materials from drums, packages, or cakes: friction-lid bucket or can, clean and dust-free, dry, with a minimum capacity of 1 gal. (4 L).

4.4 Seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

4.5 Proceed to Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples within this test procedure.

Figure 1
Examples of Valves Commonly Used for Sampling Liquid Asphalt from Tanks

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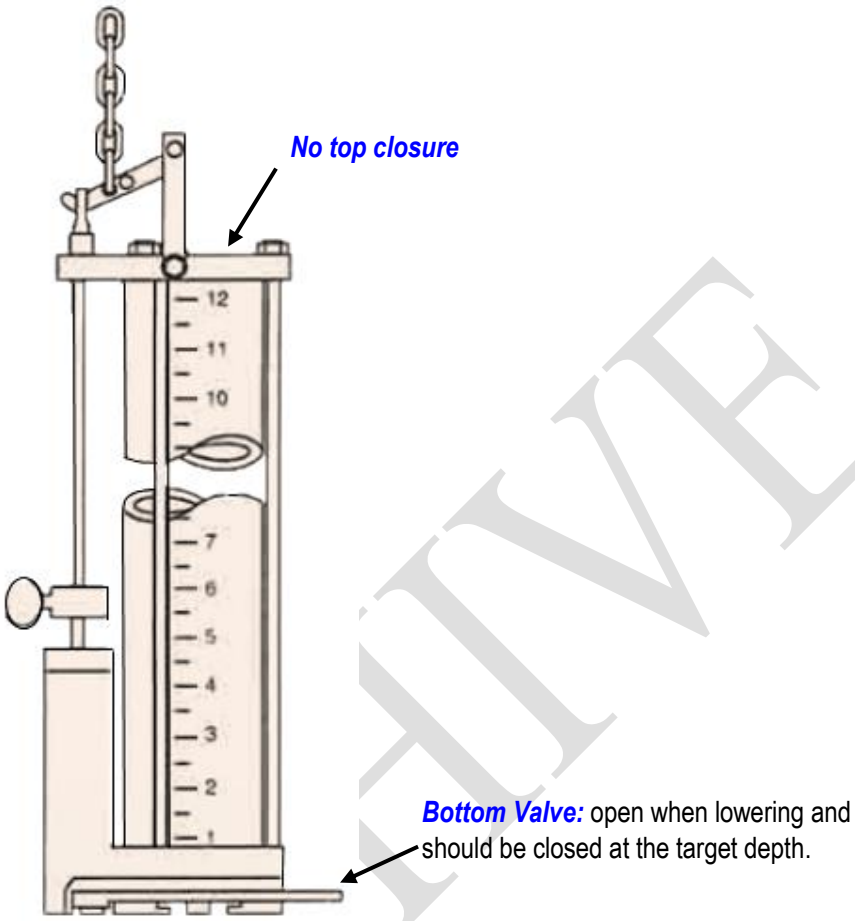

Figure 2
Schematics of an Acceptable Thief Sampler Device Used for Sampling Liquid Asphalt

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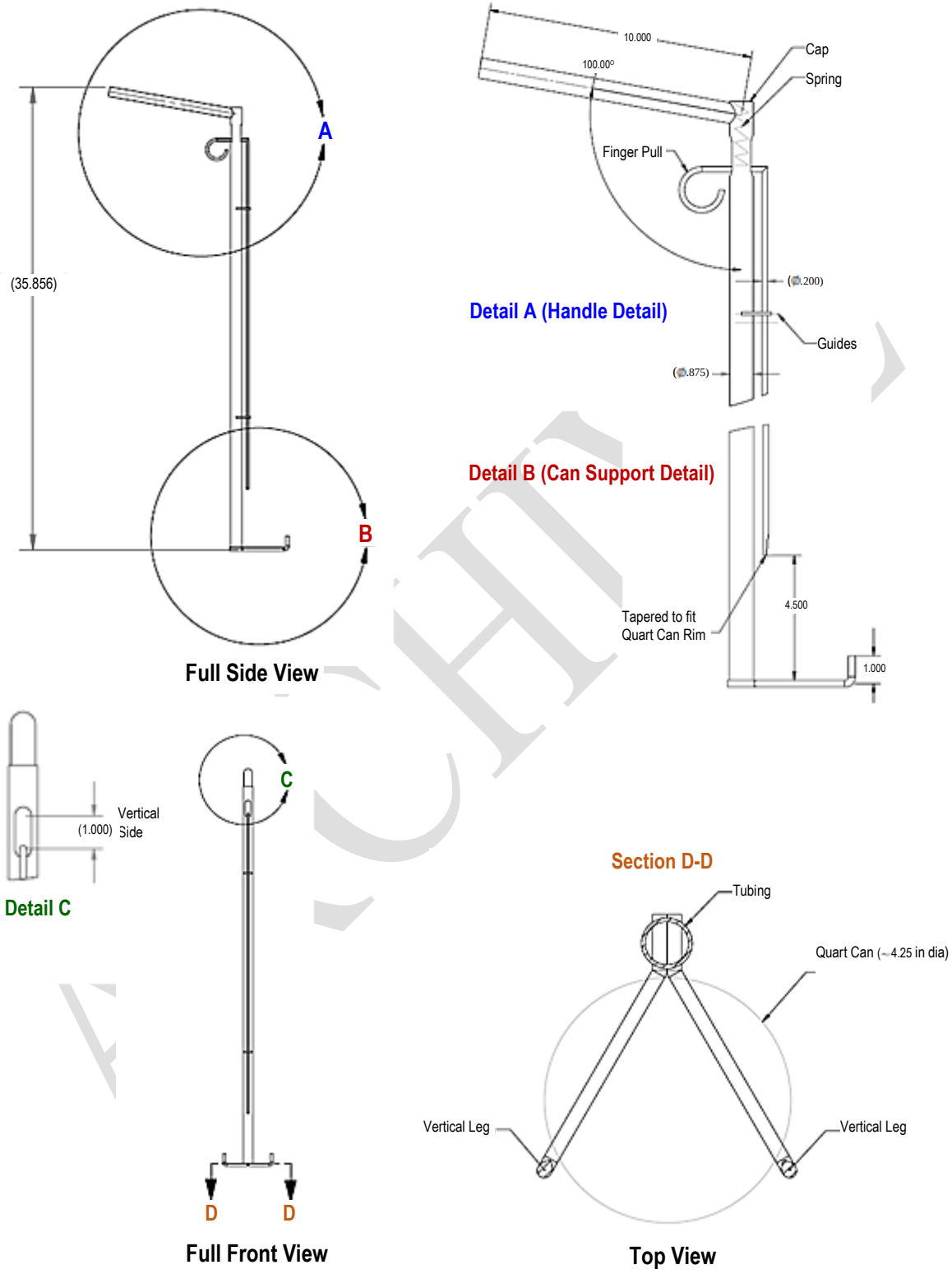

Figure 3

Schematics of a Common Dip Sampler Device Used for Sampling Liquid Asphalt

PART II—SAMPLING FROM PIPELINES

5. SCOPE

5.1 Samples can be taken from the pipeline when:

- loading or unloading tankers or barges;
- the pipeline is filling tank cars, distributors, or drums; or
- the asphalt line is feeding the mix plant.

5.2 Use the following procedure when sampling liquid bituminous materials from pipelines.

6. PROCEDURE

6.1 A sampling pipe of not more than 1/8 the diameter of the pipeline, with a drain cock used to regulate the flow through it, is required. Figure 4 shows common types of valves used for sampling liquid asphalt from pipelines. The sampling pipe should be inserted into the pipeline at a right location with its opening turned to face the flow of the liquid.

6.1.1 For a flow under pump pressure, the right location is the rising section of the line on the discharge side of the pump.

6.1.2 For a flow under gravity, the right locations are the parts of the pipeline which are completely full.

6.2 When sampling from a drain cock, open the drain cock and allow enough material (a minimum of 1 gal or 4 L) to flow into a waste container to clear the sample cock and sample line from old material.

6.2.1 Fill the sample container from the valve or drain cock.

6.2.1.1 When sampling liquid asphalts other than emulsions, fill the container to approximately 95% capacity; leaving a small amount of space for stirring the sample before the tests. When sampling emulsions, completely fill the container to avoid any air entrapment in the sample.

6.2.1.2 Use appropriate containers with a capacity corresponding to the required amount of material for sampling:

- liquid asphalt, other than emulsions and cutbacks: double-seal friction-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- emulsified asphalt: wide-mouth plastic jars, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- cutback asphalt: double-seal friction-top or screw-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L).

6.2.2 Tightly close and seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

6.2.3 Proceed to Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples within this test procedure.

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6.3 When a large quantity of liquid asphalt is being transferred through pipeline (e.g., loading or unloading tankers or barges), multiple number of 1-gal (4-L) samples should be taken to obtain an overall representative sample.

6.3.1 The minimum number of required samples depends upon the amount of the material being transferred. For instance, for loading or unloading of tankers or barges with a capacity of

- less than 25,000 barrels (4,000 m^3), at least five 1-gal (4-L) samples is required, or
- more than 25,000 barrels (4,000 m^3), at least ten 1-gal (4-L) samples is required.

6.3.2 Sampling should be uniformly distributed during the loading or unloading process.

6.3.3 To obtain a representative sample, all the collected individual samples should be thoroughly mixed in a larger container (sample receiver) at the end of loading or unloading process. Then, a 1-gal (4-L) representative sample should be taken from the mixed material in the sample receiver.

6.3.4 Tightly close and seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

6.3.5 Proceed to Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples within this test procedure.

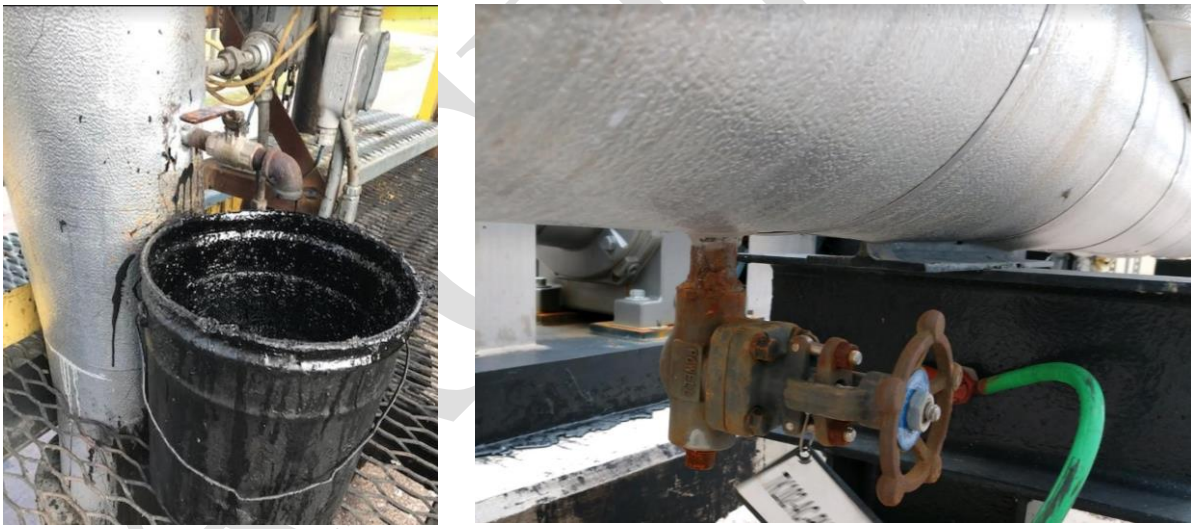

Figure 4
Examples of Valves Commonly Used for Sampling Liquid Asphalt from Pipelines

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PART III—SAMPLING FROM TANK CARS, TRUCKS, OR DISTRIBUTORS

7. SCOPE

7.1 Use this procedure when sampling liquid or semi-solid bituminous materials from tank cars, trucks, or distributors.

8. PROCEDURE

8.1 If possible or if there is a concern regarding the quality of the material delivered, carefully inspect the material for the presence of foam, sediment, or free water on top or bottom of the car or truck. Make notation of such observations.

8.2 When sampling semi-solid materials, heat the materials to fluidity. (Sample all liquid materials without heating, if possible.)

8.3 When sampling from distributors, circulate and mix the material thoroughly with the pump.

8.4 Wearing the required safety equipment, collect the sample using sampling port / valve designed on these delivery vehicles or distributor. Sampling valve should be installed at least 1 ft (305 mm) away from the shell of the tank and should be also labeled as "sampling valve." If only one sample is needed, it is recommended to obtain the sample halfway through the unloading process.

8.5 When sampling port or valve does not exist, a representative sample can be obtained by using Sampling Pipe Fitting or Thief or Dip Sampler method. In addition, samples from a distributor can also be obtained directly from the spray bar.

8.5.1 Sampling Pipe Fitting: sampling can also be done by mounting a detachable or permanent sampling pipe fitting in the discharge line, between the unloading pipe and hose, and close to the end. Figure 5 demonstrates schematics of a detachable sampling pipe fitting device. When unloading tanker trucks, using this device slowly, collect a sample from the middle third of the unloading process.

8.5.2 Thief or Dip Sampler Method: Obtain a sample from the top of the truck by lowering the sampling device through the top hatch, similar to what was described in Part I. Due to safety concerns, it is not recommended to take samples by Thief or Dip method from the top of the vehicle, unless no other method of sampling is available.

8.5.3 Sampling from the Spray Bar: when sampling from a distributor nozzle, allow at least one full shot after the start of the workday, or after cleaning the spray bar, to insure that any cleaning agent has been cleared from the spray bar.

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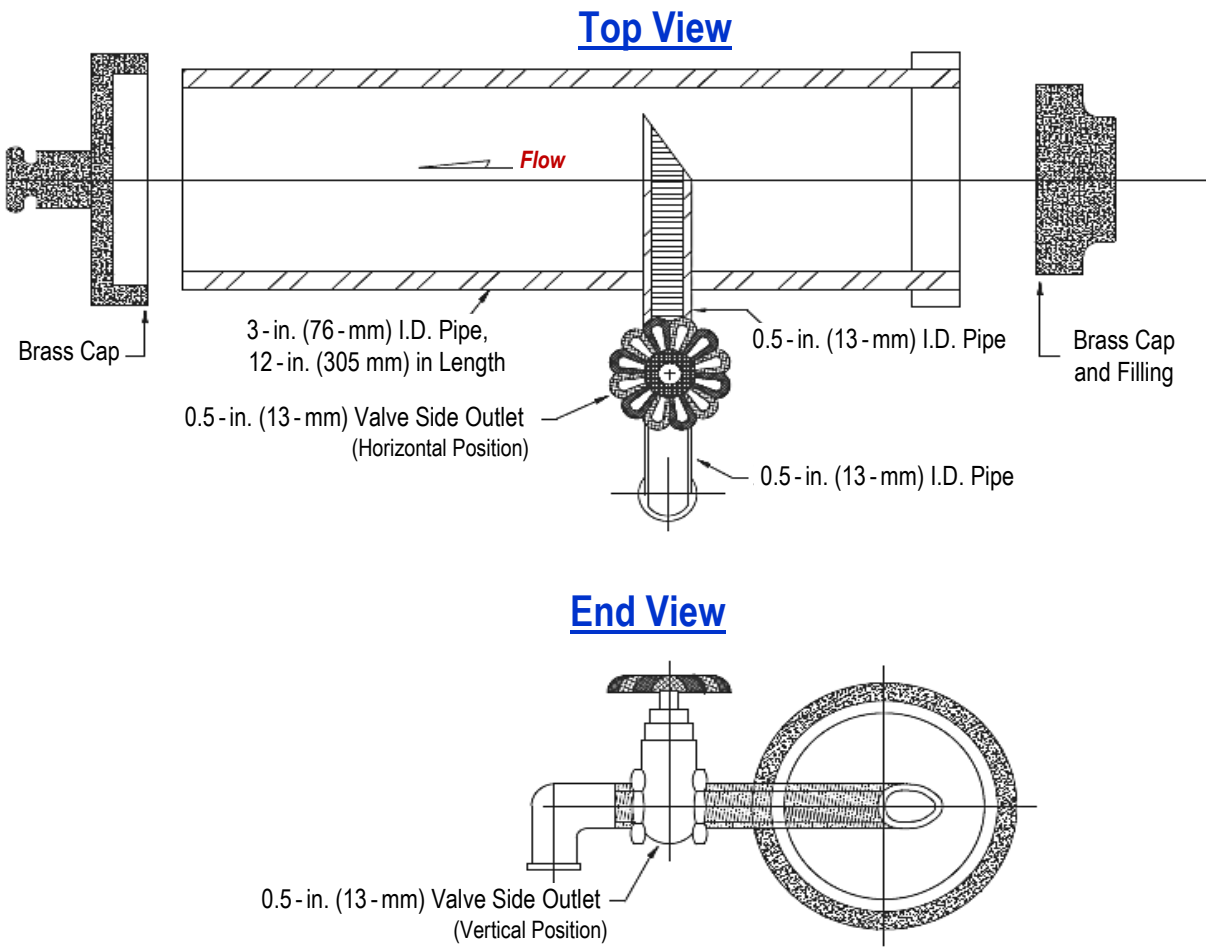

Figure 5
Schematics of a Typical Detachable Sampling Pipe Fitting Device

8.6 When obtaining a sample from the sampling port or Sampling Pipe Fitting (loading or unloading line), open the appropriate valve or drain cock and allow enough material (a minimum of 1 gal or 4 L) to flow into a waste container to ensure removal of old material and collection of a representative sample.

8.7 Pour the material into a clean container.

8.7.1 When sampling liquid asphalts other than emulsions, fill the container to approximately 95% capacity; leaving a small amount of space for stirring the sample before the tests. When sampling emulsions, completely fill the container to avoid any air entrapment in the sample.

8.7.2 Use appropriate containers with a capacity corresponding to the required amount of material for sampling:

- liquid asphalt, other than emulsions and cutbacks: double-seal friction-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- emulsified asphalt: wide-mouth plastic jars, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L);
- cutback asphalt: double-seal friction-top or screw-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L).

8.8 Tightly close and seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

8.9 Proceed to Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples within this test procedure.

PART IV—SAMPLING FROM IN-LINE BLENDED MATERIALS

9. SCOPE

9.1 Use this procedure when the material supplier is blending finished grades of asphalt material directly into trucks using an automatic blending system.

9.2 The producer should assign a batch number to each individual grade of asphalt produced through an automatic blender. The producer must change this number each time either of the blending stocks or formulation is changed.

10. PROCEDURE

10.1 Auto-sampling devices that collect samples, during or throughout the loading process, may be used as approved by the Engineer or as approved for use in the supplier's quality plan. Figure 6 shows an auto-sampler device installed towards the end of a loading pipeline. This type of auto-sampler collects a large number of small samples at constant intervals using compressed air force. Compressed air forces a plunger into the transfer line to capture a fixed volume of material and then the plunger will be pulled back to a position which allows the sample to drop by gravity into the sampling container.

10.2 If the auto-sampler device is not available, obtain the sample from a trial blend, the first truck of each batch using the procedure described in Part III, or from the loading pipeline using the procedure described in Part II.

10.3 When sampling liquid asphalts other than emulsions, fill the container to approximately 95% capacity; leaving a small amount of space for stirring the sample before the tests.

10.3.1 Use appropriate containers with a capacity corresponding to the required amount of material for sampling:

- liquid asphalt, other than emulsions and cutbacks: double-seal friction-top metal cans, clean and dust-free, dry, with a minimum capacity of 1 qt. (1 L).

10.4 Tightly close and seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

10.5 Proceed to Part IX—Recording, Labeling, Packaging, Storing, and Shipping of Samples within this test procedure.

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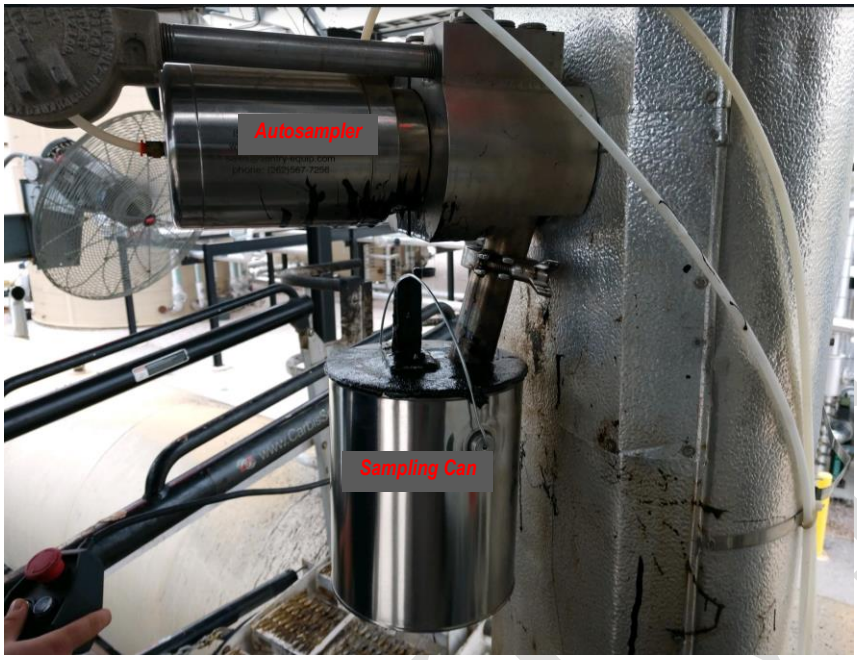

Figure 6
An Autosampler Device Installed towards the End of a Loading Pipeline

PART V—SAMPLING FROM DRUMS, PACKAGES, OR CAKES

11. SCOPE

11.1 Use this procedure when sampling solid or semisolid bituminous materials from drums, packages, or cakes.

12. PROCEDURE

12.1 Collect the number of samples requested by the Engineer.

12.1.1 If sampling the lot of material from a single batch of the producer, select one unit at random for sampling.

12.1.2 If not sampling the lot of material from a single batch, or if a singular sample from the lot fails to meet specifications, select a number of units equal to the cube root of the total number of units in the lot, rounding up to the next whole number. For instance, take four samples for lots from 28 units up to 64 (4x4x4) units, and take five samples from lots of 65 and up to 125 (5x5x5) units. Table 1 summaries the number of samples that need to be selected for different numbers of units.

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Table 1

Recommended Number of Samples to be Selected

Total Number of Units	*Number of Samples Need to be Selected*
2 to 8	2
9 to 27	3
28 to 64	4
65 to 125	5
126 to 216	6
217 to 343	7
344 to 512	8

12.2 To collect a representative composite sample, obtain samples of material, each individually

- have a mass of at least 1/4 lb. (100 g), and
- from locations at least 3 in. (76 mm) below the surface and 3 in. (76 mm) from the side of the container or from the middle of the cake.

12.2.1 Fill a 1 gal (4 L) friction-lid can or bucket to almost 95% of its capacity as the final sample.

12.2.2 Melt and thoroughly mix materials from the same batch to form one composite sample. Test materials not from the same batch separately. (Even when more than one batch is present in a particular lot, test the individual batches as composite samples if clearly identified.)

12.2.3 Tightly close and seal the sample container. In the case of using friction-top metal cans, it is recommended to secure the lid using appropriate metal lid clips.

12.3 If the containers of material are not unreasonably large for shipment, use an entire container as a sample.

12.4 Record sample details, label the sample, generate a Form 202 (Identification of Material Samples), and ship the sample to MTD.

PART VI—SAMPLING PRE-MOLDED EXPANSION JOINT FILLER AND ASPHALT PLANK

13. SCOPE

13.1 Use this procedure when sampling pre-molded materials, such as joint filler and asphalt plank.

14. PROCEDURE

14.1 Take a sample at least 12 x 12 in. (30 x 30 cm) for each thickness of material, for each type, and for each producer.

14.2 When material is in irregular shapes or sizes, use a piece of at least 1 ft.^{2} (900 cm^2) of each thickness, type, and producer as the sample.

Note 1—Do not use pieces less than 4 in. (100 cm), in any dimension, as samples.

14.3 Enclose the sample in a box or tie it securely to a light piece of board or plywood and wrap it to avoid damage during shipment.

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14.4 Record sample details, label the sample, generate a Form 202 (Identification of Material Samples), and ship the sample to MTD.

PART VII—SAMPLING JOINT SEALERS

15. SCOPE

15.1 Use this procedure for all types of joint sealers, including hot-poured rubber, asphalt-rubber crack sealant, single component synthetic polymers, and two-component synthetic polymers. The manufacturer usually packages these materials in individual containers.

16. PROCEDURE

16.1 Collect the number of samples requested by the Engineer. It is recommended to submit one sample for each lot or batch number (numbered by manufacturer) of sealer in the shipment.

16.2 Avoid opening individual packages whenever possible. If the packages are not unreasonably large for shipment, use an entire package as the sample. For instance, when sampling two-component sealers, if the components are packaged together, as a can carrying a 'Piggyback' container inside, take one unit for the sample.

16.3 Sample large containers in accordance with Part V with the following considerations.

16.3.1 Hot Poured Rubber Asphalt Joint Sealer and Rubber Asphalt Crack Sealing Compound:

- Obtain one container from each batch or lot;
- When several batches make up a shipment, combine them to make one lot; and
- Take one sample to represent the shipment.

16.3.2 Single-Component, Ready Mixed, Cold-Applied Sealer:

- Stir thoroughly before sampling; and
- Fill one bucket per sample.

16.3.3 Two-Component Sealers:

- Stir any liquid components thoroughly;
- Pour from one can to a clean, empty container to check for settlement;
- Take one full bucket sample for any liquid components; and
- For solid or paste components, take a sample, of appropriate size, to mix with the bucket of liquid.

16.3.4 Seal new containers of any synthetic polymer materials immediately, to minimize exposure to air and to prevent premature curing.

16.4 Small samples of hot-applied material can be directly collected from the applicator, after dispensing enough material to ensure any leftover product in the hose or applicator has been purged.

16.5 For two-component materials, include specimens of each component, packaged together, of requisite sizes for the specified mix proportions.

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16.6 Include specimens of primers with samples of sealants where primers are used.

16.7 Record sample details, label the sample, generate a Form 202 (Identification of Material Samples), and ship the sample to MTD. Include the following information with the shipment:

Consignment of Sample. (EXAMPLE: Requisition and Board Control Number, contractor, and project information, or warehouse name and location);

Mixing proportions by weight or volume, as appropriate, for two-component materials; and

The amount of material represented by the sample for single-component material, or of each component for two-component material.

PART VIII—SAMPLING BITUMINOUS MARKER ADHESIVE

17. SCOPE

17.1 Use this procedure for sampling bituminous marker adhesive.

18. PROCEDURE

18.1 Obtain a 12 to 15 lb. (5.5 to 7.0 kg) segment in a box from each batch or lot. (The material, which is typically solid at room temperature, will have been hot-poured into the sample box by the manufacturer.)

18.2 When a shipment contains several batches, combine to make one lot and take one sample to represent the shipment

18.3 Record sample details, label the sample, generate a Form 202 (Identification of Material Samples), and ship the sample to MTD. Include the following information with the shipment.

PART IX—RECORDING, LABELING, PACKAGING, STORING, AND SHIPPING OF SAMPLES

19. SCOPE

19.1 Use this procedure for recording, labeling, packaging, storing, and shipping of samples.

20. MATERIALS

20.1 Label maker, compatible with 24 mm (0.94 in.) TZe tapes and is able to connect to a PC and run P-touch Editor.

Note 2—Examples include Brother P-touch label maker models PT-D600 or PT-P700.

20.2 TZe-S251 Extra Strength Adhesive Tape, temperature resistant from -112°F to 356°F (-80°C to 180°C) and rated for rough, textured, and painted surfaces.

20.3 Shipping container or box, appropriate for shipping samples.

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20.4 Labeling Marker, such as a Sharpie, magic marker, or felt tip pen.

21. PROCEDURE

21.1 After acquiring the sample in the appropriate sample container, attach the identifying tag or mark the sample container with the name of producer, producer facility location, type and grade of material, district, date sampled, and project information including highway and CSJ.

21.2 If the samples are shipped to Materials and Tests Division (MTD) for testing, proceed to Section 21.3. If the sample is being stored, proceed to Section 21.4.

Note 3— Collect split samples for all asphalt binder materials sent to MTD for testing.

Note 4— Refer to the Asphalt Binder Inspection and Sampling Guidance document for more information regarding asphalt binder samples.

21.3 Log sample into SiteManager and generate a SiteManager ID. Populate the fields in SiteManager that are needed to completely identify the sample.

21.3.1 Generate a Form 202 in SiteManager.

Note 5— Producers may manually fill the Form 202 (Identification of Material Samples).

21.3.2 Copy and paste SiteManager ID into printer software and ensure bar code protocol "Code 128" is selected.

21.3.3 For asphalt samples, print three copies of the bar code and attach two bar codes to the sides of the sample container in the vertical direction.

Note 6—For samples composed of multiple samples, such as two part joint sealants, print and place as many bar codes as needed to attach two bar codes for each part of the products being tested, and print one additional bar code.

21.3.4 Print Form 202.

21.3.5 Place the samples in shipping container or box along with a copy of the Form 202 for each sample. Attach the additional bar code to the outside of the shipping box.

21.3.5.1 If multiple samples are shipped in the same shipping box, attach the corresponding bar code for each sample to the outside of the shipping box.

21.3.5.2 Do not include any other materials (e.g. aggregates, HMA, etc.) in the same shipping box used for shipping asphalt samples.

21.3.5.3 Use wadded paper (e.g., newspapers) as packing material. Avoid materials such as shredded paper, bubble wrap, and Styrofoam pellets.

21.3.6 Obtain the tracking number and add it to the sample in SiteManager.

21.3.7 Ship the samples to MTD.

21.4 For samples being stored, transport the samples to the designated storage area (e.g. district laboratory, area office, or other approved storage area.)

21.5 In SiteManager, associate the sample with the project information and document the number of transports received for each day.

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21.6 Store the samples of hot-applied asphalt binders and cutback asphalts in the designated area for a minimum of one yr. The minimum storage time for emulsified asphalts is two mo. Organize the samples by sample type, date, and project.

Note 7—MTD may later request these samples for additional testing.

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